

<b>Office Action Summary</b>	<b>Application No.</b> 10/828,745	<b>Applicant(s)</b> WHITEHEAD ET AL.	
	<b>Examiner</b> Gregory C. Issing	<b>Art Unit</b> 3662	

**-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --**

**Period for Reply**

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) OR THIRTY (30) DAYS, WHICHEVER IS LONGER, FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133). Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

**Status**

- 1) ☒ Responsive to communication(s) filed on 11/26/08 and 2/11/09 (interview).
- 2a) ☐ This action is **FINAL**.                      2b) ☒ This action is non-final.
- 3) ☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

**Disposition of Claims**

- 4) ☒ Claim(s) 48-59 is/are pending in the application.
- 4a) Of the above claim(s) \_\_\_\_\_ is/are withdrawn from consideration.
- 5) ☐ Claim(s) \_\_\_\_\_ is/are allowed.
- 6) ☒ Claim(s) 48-59 is/are rejected.
- 7) ☐ Claim(s) \_\_\_\_\_ is/are objected to.
- 8) ☐ Claim(s) \_\_\_\_\_ are subject to restriction and/or election requirement.

**Application Papers**

- 9) ☐ The specification is objected to by the Examiner.
- 10) ☐ The drawing(s) filed on \_\_\_\_\_ is/are: a) ☐ accepted or b) ☐ objected to by the Examiner.  
Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).  
Replacement drawing sheet(s) including the correction is required if the drawing(s) is objected to. See 37 CFR 1.121(d).
- 11) ☐ The oath or declaration is objected to by the Examiner. Note the attached Office Action or form PTO-152.

**Priority under 35 U.S.C. § 119**

- 12) ☐ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).
- a) ☐ All    b) ☐ Some \*    c) ☐ None of:
1. ☐ Certified copies of the priority documents have been received.
  2. ☐ Certified copies of the priority documents have been received in Application No. \_\_\_\_\_.
  3. ☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).

\* See the attached detailed Office action for a list of the certified copies not received.

**Attachment(s)**

- |  |  |
|--|--|
| 1) <input checked="" type="checkbox"/> Notice of References Cited (PTO-892)          | 4) <input checked="" type="checkbox"/> Interview Summary (PTO-413) |
| 2) <input type="checkbox"/> Notice of Draftsperson's Patent Drawing Review (PTO-948) | Paper No(s)/Mail Date. <u>2/11/09</u> .                            |
| 3) <input type="checkbox"/> Information Disclosure Statement(s) (PTO/SB/08)          | 5) <input type="checkbox"/> Notice of Informal Patent Application  |
| Paper No(s)/Mail Date _____.   | 6) <input type="checkbox"/> Other: _____.                          |

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1. The following is a quotation of the first paragraph of 35 U.S.C. 112:

The specification shall contain a written description of the invention, and of the manner and process of making and using it, in such full, clear, concise, and exact terms as to enable any person skilled in the art to which it pertains, or with which it is most nearly connected, to make and use the same and shall set forth the best mode contemplated by the inventor of carrying out his invention.

2. Claims 48-59 are rejected under 35 U.S.C. 112, first paragraph, as failing to comply with the written description requirement. The claim(s) contains subject matter which was not described in the specification in such a way as to reasonably convey to one skilled in the relevant art that the inventor(s), at the time the application was filed, had possession of the claimed invention.

3. The following limitations are not described in the specification in such a way as to reasonably convey to one skilled in the art how to make and/or use the subject matter. In claim 48, the following claim limitations represent new matter that is not found in the original specification:

- a. “determining the GNSS-defined positions of master and slave antennas on a structure” using the claimed method; it is noted that in each paragraph of the *Summary of the Invention* as well as each of the original claims, the applicants disclose “measuring relative position”;
- b. “mounting said antennas for independent multipath effects”; there is no positively recited step in the disclosure which sets forth any specific mounting instructions;
- c. “constraining said antennas”;
- d. “determining a position solution . . . using: (1) a position solution equation with six unknowns . . . master antenna”;

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- e. “determining a position solution . . . using: . . . (2) the position of the master antenna”;
  - f. “determining a position solution . . . using: . . . (3) the known distance and geometry constraints of the spatial relation of the master antenna relative to the slave antenna”; and,
  - g. “determining a position solution . . . using: . . . (5) multipath mitigation by averaging multipath effects.”
4. Claim 50 is insufficiently disclosed since the step of “*resolving an integer ambiguity* using a single differencing technique *based on said known constrained spatial relation* of said master and slave antennas” is not described in the specification and represents new matter.
5. Claim 51 is insufficiently disclosed since the specification fails to describe “*determining a point location* on said structure *based on said known constrained relation* of said master and slave antennas.”
6. Claim 53 is insufficiently disclosed in the specification since there is not disclosure of a *terrestrial vehicle* in the specification as originally filed. This represents new matter into the application.
7. Claim 55 represents new matter since there is no disclosure in the specification as filed for the structure to be a wall and said signal blocking object comprises a portion of the wall.
8. Claim 58 is insufficiently disclosed since the specification is silent with respect to an *earth-fixed coordinate system*.
9. Claim 59 is insufficiently disclosed since the specification is silent with respect the determination of a GNSS-defined location in an earth-fixed coordinate system based on: (1) said

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known distance and geometry constraints of the spatial relation of the master antenna relative to the slave antenna; and (2) known distance and geometry constraints of the spatial relation of the point to said master and slave antennas.

10. Each of the above limitations represents new matter that is required to be cancelled. If applicants traverse the rejection, they are required to show where, in the original specification, each of the limitations are sufficiently disclosed in a manner so as to enable someone skilled in the art to make and/or use the subject matter. However, the Examiner has thoroughly reviewed the original specification and cannot find disclosures for any of the above-noted limitations.

11. Claims 48-59 are rejected under 35 U.S.C. 112, first paragraph, as failing to comply with the enablement requirement. The claim(s) contains subject matter which was not described in the specification in such a way as to enable one skilled in the art to which it pertains, or with which it is most nearly connected, to make and/or use the invention.

12. The claims are non-enabling with respect to the limitations set forth in paragraphs 3-8 above since the limitations are not described in the specification as originally filed and there is no description to enable someone skilled in the art to make and/or use the claimed subject matter on the basis of the above-noted limitations. The applicants appear to be relying on subject matter set forth in the Exhibit of Attachment A. However, the Exhibit does not represent a priority document nor are the teachings of such incorporated in the specification of the instant application as filed. Thus, the claims are non-enabling with respect to each of the limitations set forth in paragraphs 3-8 above.

13. In claim 50, the step of "resolving integer ambiguity . . . based on said known constrained spatial relation of the said master and slave antennas" is non-enabling. The specification fails to

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disclose in what manner the ambiguity is resolved on the basis of "the constrained spatial relation".

14. In claim 51, the specification fails to provide an enabling disclosure for the determination of a point location based on the known constrained relation of said master and slave antennas.

Paragraph [0056] of the specification merely teaches "multiple antennas could be used to compute a solution of a single point . . . using known geometry and distances," "placing an antenna . . . a solution of the location of some point . . . could still be obtained," and "using the combined receivers to produce one non-relative location." However, these statements do not enable someone skilled in the art to make the invention since it only represents a statement of what could be done without a showing of how it could be done.

***Claim Rejections - 35 USC § 112, paragraph 2***

15. The following is a quotation of the second paragraph of 35 U.S.C. 112:

16. Claims 48-59 are rejected under 35 U.S.C. 112, second paragraph, as being indefinite for failing to particularly point out and distinctly claim the subject matter which applicant regards as the invention.

17. In claim 48, lines 1-2, the method is directed to *determining the GNSS-defined positions of master and slave antennas on a structure*. However, the embodiment from the specification to which the body of the claim appears to be directed, i.e. one in which neither antenna can receive signals from a sufficient number of satellites, is to the determination of a single point of a body [0056] or to produce one non-relative location [0056]. Thus the preamble fails to clearly and distinctly define the subject matter. Each of the statements in the Summary of the Invention and

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each preamble of the claims as filed are directed to determining relative location between master and slave antennas. Thus, the claim is misdescriptive.

18. In claim 48, line 7, “on said moving object” lacks a proper antecedent basis since the preamble merely sets forth a “structure”.

19. In claim 48, line 9, it is not clear what the limitation “mounting said antennas for independent multipath effects” is and it is not clear where the specification teaches such a step of mounting. As understood, this would be achieved inherently by mounting any two antennas separate from one another. There is no disclosure in the original specification which actively mounts antennas in a manner so as to create independent multipath effects. The specification merely states that multipath may be reduced.

20. In claim 48, line 10, it is not clear what the limitation “constraining said antennas relative to each by a fixed distance and geometry” is. As understood, this will be interpreted as the master and slave antennas having a fixed, relative position. There is no disclosure in the original specification which actively “constrains” antennas. It is not clear what the applicants’ interpretation of the terminology “constrains” is and how it is defined by the specification.

Moreover, it is not clear if in fact the antenna is “constrained” or if the solution is “constrained.”

21. In claim 48, line 11-12, the step of “further constraining the antennas . . . by providing a common clock . . .” fails to clearly define the subject matter since it is not understood how a common clock constrains *antennas*.

22. In claim 48, lines 13-14, the use of the language “one of said antennas” and “the other of said antennas” lacks clarity since the antennas at issue are initially described as *master* and *slave* and such description should be maintained in the claim.

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23. In claim 48, lines 17-28, the determination of the position solution is not distinctly set forth. The claim fails to set forth in a clear manner how a *position solution*, which position solution apparently represents *the GNSS-defined positions of the antennas*, is determined from the five elements listed therein. For example, the *equation* is not defined in the specification nor the claims. Also, if the position of the master antenna is known, i.e., it is used in the solution, what is the purpose of the position solution comprising the GNSS-defined position? The known distance and geometry constraints of the spatial relation are described as *eliminating an unknown* from the position solution; which of the six unknowns is eliminated? The use of a common clock or operation via synchronized clocks is set forth as *eliminating another unknown*; again which of the six unknowns is eliminated? The claim fails to clearly set forth how the multipath mitigation is used in determining the position solution.

24. In claim 48, line 12, the parenthetical expression is not clear; it would appear to be superfluous.

25. Claim 49 is misdescriptive since the use of a compass to determine bearing between the master and slave antennas is not clear. The master and slave are previously described in claim 48 as having a "fixed, spaced relation" "by a fixed distance and geometry". Thus the use of a compass to define such a bearing as between the master and slave is not understood. The only description of a "compass" in the specification is in paragraph [0056] and it merely states "a compass could also be used to give orientation, thus removing another unknown from the relative location of the two receivers." It is not clear how such a description supports the claim language.

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26. In claim 58, “determining the GNSS-defined absolute locations” lacks a proper antecedent basis.

***Claim Rejections - 35 USC § 103***

27. The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

(a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negated by the manner in which the invention was made.

28. Claims 48-59 are rejected under 35 U.S.C. 103(a) as being unpatentable over Dichavez (6,191,733) in view of either one of Sahm et al (5,404,661) or Duddek et al (5,144,317) and any one of Dooley et al (6,646,603), Wilson (6,292,132) or Hwang (5,021,792).

29. Dizchavez teaches mounting master and slave GPS units 18/20 on a rigid structure 12 of a work machine 10 at two known locations, i.e. having a fixed, spaced relationship, wherein each GPS unit incorporates an antenna. The two known locations are separated by as much distance as possible on the structure, exemplified as one of the front corners of the body 12 (point 1) and the rearmost point along the main horizontal axis of the machine (point 2) at a distance of 15.5 meters apart. The work machine is described as human-operated excavators, shovels, backhoes and the like. Thus, master and slave GNSS receivers are provided by the two GPS units 18 and 20; master and slave antennas are provided and connected to each respective GPS unit; the antennas are mounted in a fixed, spaced relation on the body at a forward-most and rear-most location of the human-operated machine; as the mounted antennas are spaced, they inherently observe independent multipath effects; the antennas are fixed and therefore are “constrained” relative to each other by a fixed distance and geometry; each GPS unit inherently incorporates a



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clock; each GPS unit receives GNSS signals including from at least three satellites; and, a position solution is solved to determine the positions of the antennas, the orientation of a plane defined by the antenna positions, and the position of a single point is, such as an articulated boom or shovel bucket. In light of the measurements of position over time and the updating of the position solution, multipath effects inherently will be reduced.

30. Dizchavez differ from the claimed subject matter, as best understood, since a “satellite-blocking structure” is not specifically identified and since one of the antennas is not disclosed as receiving “no more than three satellites due to said satellite blocking object.” Additionally, the GPS units are not specified as sharing a common clock or using synchronized clocks. Lastly, due to the lack of clarity and insufficiency of disclosure for the claimed position solution, no realistically ascertainable scope is possible and thus, no comparison with the prior art is possible

31. It is well-known that human-operated work machines, such as excavators, incorporate a cabin/structure in which the human operate sits or in which structures are positioned between the front corner and rearmost portions of the work machine, see

32. Obviously, between the front corner of the body and the rearmost portion of the body of an excavator, there is a cabin that would provide structure which would block satellites at certain elevations from being received at both antennas/receivers. Sahm et al (5,404,661) teaches an example of an excavator wherein an antenna element placed on the front corner and an antenna placed as far as possible on the rearmost location would be separated by "satellite-blocking" structure, see Figures 1 and 2. Also, Duddek et al (5,144,317) teach an example of an excavator wherein the front corner and a location as far as possible from the front corner and on the rearmost location would be separated by "satellite-blocking" structure consisting of cranes and

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towers and other structures, See Figure 2. Thus, it would have been obvious to one having ordinary skill in the art that various structures on the work element of Dizchavez would be situated between the front corner antenna position and the rearmost antenna position. Moreover, by the nature of the structure, the positioning of the satellites and the work environment, such as a mine pit, it is obvious that at times, one of the antennas may be obscured from the minimum number of satellites required for a solution.

33. Dooley et al (6,646,603) teach the determination of a GPS position of a receiver when fewer than the minimum number of satellites are in view wherein a first receiver receives additional pseudorange measurements from a second receiver so as to determine a position on the basis of signals from in-view satellites at the first receiver and signals from in-view satellites at a second receiver wherein at least one of the signals from the second receiver was not obtained at the first receiver (2:19-37). Dooley et al also recognize the elimination of a clock variable when the first and second devices are synchronized (2:38+).

34. Wilson (6,292,132) teaches the conventionality of a plurality of GPS receivers 36/38 sharing a common clock 40, as shown in Figure 2, wherein it is stated "(i)deally, the GPS receivers 36, 38 are controlled by a common clock 40 such that the system can operate on a single satellite signal 22 (1) or 22(2). If, however, each GPS receiver 36, 38 includes its own independent clock (not shown), then at least two satellite signals 22(1) and 22(2) will be required" (3:50-64). Thus, Wilson teaches that it is known that a common clock allows for the elimination of an unknown variable since clock error is eliminated. Moreover, Wilson teaches "(b)y combining the signals or information detected by the antennas 14, 16 and received by the GPS receivers 36, 38, noise effects can be reduced by averaging out noise sources that do not

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correlate across the two systems. Because the separate antenna/receiver systems may be affected differently by noise sources due to the different spatial arrangement of the antenna relative to the vehicle and the possible noise source, the processor 34 can operate to average out those sources of noise not specifically correlating between the two antenna/receiver systems.” This is further extended to multipath (4:49+).

35. Hwang (5,021,792) discloses the conventionality of GNSS antennas/receivers 20a-c/22a-c, on a structure for receiving GNSS signals wherein the operation of a common clock, as opposed to the use of separate clocks for each receiver, eliminates clock timing errors (5:14+).

36. Thus, each of Dooley et al, Wilson, and Hwang teach that it is known in the art to eliminate an unknown in a position solution by sharing a common clock or operating in clock synchronization so as to eliminate the clock error unknown. It would have been obvious to one having ordinary skill in the art at the time the invention was made to modify Dizchavez by sharing a common clock between the two GPS units since the sharing of a common clock is known as shown by one of Dooley et al, Wilson or Hwang and since the modification would yield a predictable result of eliminating an unknown, i.e. the clock error, in the position solution. The dependent claims, as best understood due to the lack of an adequate disclosure/support, are obvious to the skilled artisan in view of the combination of references.

37. The applicants’ arguments in the previous response are not applicable in light of the newly drafted claims and the newly drafted rejection over the prior art.

### ***Conclusion***

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38. The prior art made of record and not relied upon is considered pertinent to applicant's disclosure. Although some of these references have been previously made of record in the case, they are repeated to show specific features for which the applicants allege novelty.

39. Hockley, Jr. et al (7,084,809) teach a GNSS receiver that determines a position solution when fewer than a minimum number of satellites are visible wherein the solution is enabled by using partial position information representing pseudoranges between the device and a plurality of satellites and partial position information representing pseudoranges between a second device and a plurality of satellites from a second receiver, that is information is shared between/among plural receiving devices so as to collectively have sufficient information to accurately resolve a position (12:9-11). Additionally, Hockley, Jr. et al teach the synchronization of time clocks to time information received from a second device (11:28+).

40. Rorabaugh (6,922,635) teach that it is possible to compute respective absolute positions of GPS receivers even when fewer than three satellites are in view if range or relative spatial positioning information is known between the plurality of receivers (2:36-64).

41. Remondi (5,442,363) teaches determining a precise coordinate of a point using carrier phase differencing wherein it is further taught that if constraints are placed on one of the degrees of movement or any geometric constraint information, then fewer satellites are required (4:39+, and 10:53+).

42. The Declaration under 37 CFR 1.131/arguments overcome the Zimmerman reference. Numerous additional references supplant the teachings of Zimmerman showing the conventionality of eliminating an unknown by sharing a common clock.

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43. Any inquiry concerning this communication or earlier communications from the examiner should be directed to Gregory C. Issing whose telephone number is (571)-272-6973.

The examiner can normally be reached on Monday - Thursday 6:00 AM- 4:30 PM.

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Thomas Tarcza can be reached on (571)-272-6979. The fax phone number for the organization where this application or proceeding is assigned is 571-273-8300.

Information regarding the status of an application may be obtained from the Patent Application Information Retrieval (PAIR) system. Status information for published applications may be obtained from either Private PAIR or Public PAIR. Status information for unpublished applications is available through Private PAIR only. For more information about the PAIR system, see <http://pair-direct.uspto.gov>. Should you have questions on access to the Private PAIR system, contact the Electronic Business Center (EBC) at 866-217-9197 (toll-free). If you would like assistance from a USPTO Customer Service Representative or access to the automated information system, call 800-786-9199 (IN USA OR CANADA) or 571-272-1000.

/Gregory C. Issing/  
Primary Examiner  
Art Unit 3662

gci